Computers and Electronics in Agriculture, 7 (1992) 1-
Elsevier Science Publishers B.V., Amsterdam

Agricultural Lenders' Diagnostic System (ALDS)

Donald L. Meyer, Robert H. Hornbaker and Michael A. Mazzocco
Department of Agricultural Economics, University of Illinois at Urbana-Champaign, 305 Mumford Hall, 1301 West Gregory Drive, Urbana, IL 61801, USA

(Accepted 18 June 1991)

ABSTRACT

Meyer, D.L., Hornbaker, R.H. and Mazzocco, M.A., 1992. Agricultural Lenders' Diagnostic System (ALDS). *Comput. Electron. Agric.*, 7: 1-12.

ALDS is a user-friendly decision support system designed to help agricultural lenders score and rank loan applications. The system includes a number of predefined categories for evaluating the client. In contrast to most loan scoring models, ALDS evaluates both quantitative financial ratios and qualitative characteristics. Moreover, the ranking procedures can be adapted to fit the views of an individual bank or lender. Through the use of 'pop up' windows and an editing feature, the user can modify the weights on the various categories, financial ratios and qualitative characteristics. This flexible system also allows multiple lenders to identify their own scoring weights and save them in an individual file. The program generates a 0 to 10 score for each client. Final scores can be used in considering the risk of an individual loan application or in comparison with a number of applications. The lender can also examine strengths and weaknesses of particular loan applications by observing the score associated with the various categories used in the decision support system. Printed reports of individual financial records and multiple client scores are available as output from the model.

INTRODUCTION

In the agricultural finance sector today, lenders in the US lack a simple, flexible and fast method to rank, or score, the quantitative and qualitative merits of different applications for loans. This is especially true in the authors' experiences with lenders in smaller institutions. The concept of loan scoring is not new, having been studied by Bauer and Jordan (1971), Dunn and Frey (1976), Hardy and Weed (1980) and Lufburrow et al. (1984). Many of these models have been implemented by various lending agencies throughout the industry. However, these types of models generally include only quantitative and not qualitative factors. Moreover, the informal, often personal relationships that tend to develop between lender and borrower in

This paper is derived from research sponsored by the Norris Institute and Doane Agricultural Services Company, USA.

at least 256K RAM, and operating under MS-DOS. ALDS is designed with simplicity of use in mind, for use on the simplest hardware configuration possible. A printer is optional equipment. There are no restrictions on the type of monitor attached to the computer.

Software requirements for the use of ALDS are minimal, the DOS version used must be version 2.1 or greater. A hard disk is recommended to accommodate large numbers of client records, although small and medium databases should easily be contained on one floppy diskette along with the program files.

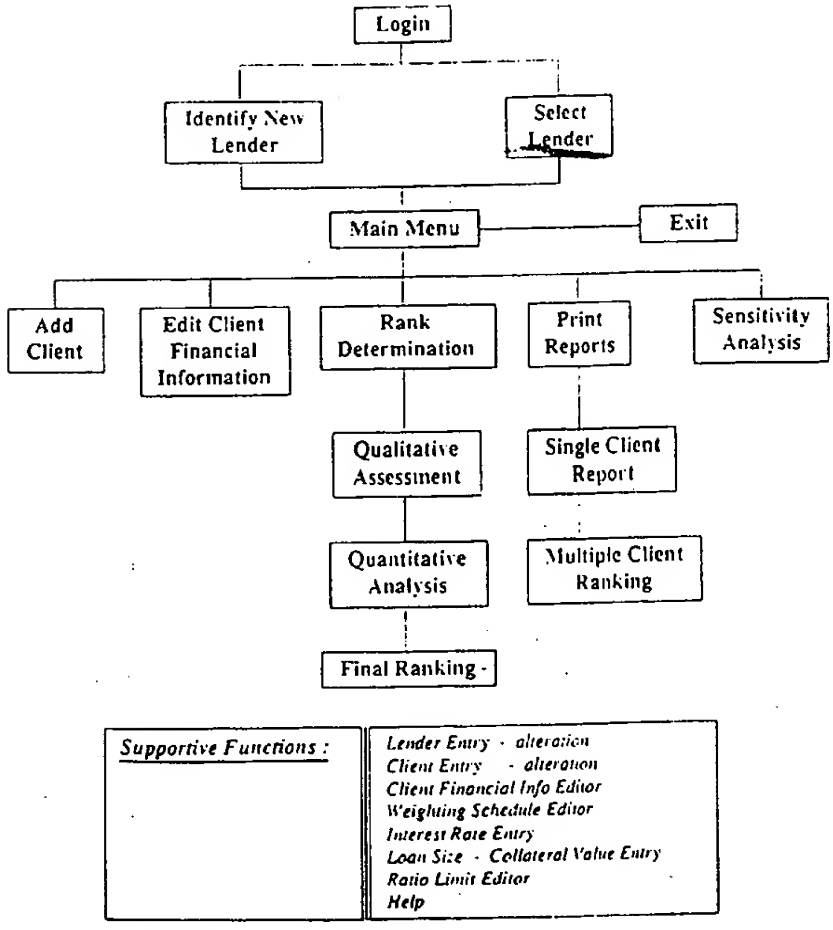

Fig. 1. ALDS structure and supportive functions.

in the bottom of Table 1. The user simply chooses the desired client and proceeds to edit the current record or enter the balance sheet and income statement data for the new year.

MAIN TASKS

Determination of a loan request's rank or score

The primary task of ALDS is to provide the lender with a score for each loan request. Its purpose is to solicit information from the lender regarding the lender's qualitative assessments of the client and the client's business operation and situation. This information is assimilated, along with quantitative information regarding the client, to derive a series of preliminary scores for various categories of concern.

The following eleven categories of concern are used in ALDS: (1) Managerial ability; (2) Financial statements; (3) Client's commitment; (4) Asset structure & quality; (5) Economic trends; (6) Other factors; (7) Liquidity; (8) Asset management; (9) Debt management; (10) Profitability; (11) Collateral.

These preliminary scores are then weighted and combined to create a final score for the loan request. To provide flexibility among types of loans, a mechanism is provided to allow different weighting schemes for different types of loans. Three differing types are provided for: Asset Purchase loans, Operating loans and Other types. Each type of loan weights the categories differently in arriving at the final score, signifying the different interactions possessed by each category in the overall desirability of a particular type of loan.

Printing of reports

Two types of reports are provided: a single-client report and a multiple-client listing. The single-client report provides a breakdown of the client's score by category for each type of loan, as well as the final score for each type. Also, the report contains the financial information used in the determination of the score, printed in the form of a simple balance sheet and income statement. An example of a single-client report is shown in Table 1.

The multiple-client listing allows the lender to select various clients to include in a list of clients. This list contains the client's name as well as the scores for each type of loan. This list can then be sorted to provide a comparison of the scores. The sort of the scores can be centered on a single type of loan or on the average of the scores for each type. Moreover, the lender can sort in ascending or descending order by the client's rank or name.

Sensitivity analysis

The task of analyzing the scores' sensitivity to changes in quantitative data is necessary to allow the lender to determine the effect on the client's score if one or more bits of information, especially the financial information provided by the client, changes or is incorrect or misrepresented. In this case, the lender is allowed to temporarily alter the quantitative information, and then see the effect of those changes on the client's score. Upon exit from this task, all changes made to the information are restored to their original values.

THE RANKING PROCESS

When the lender determines the rank for a client, he/she must first ensure that financial information for the client has been entered. If it has not, the lender cannot continue with the ranking process. This check is made at the time the lender chooses the rank determination task. If the data is present, the lender is allowed to continue with the process.

The lender is prompted to respond, one at a time, to 22 different questions. These questions solicit the lender's perceptions of the client relative to various aspects of each of the following categories of concern:
(1) Managerial ability; (2) Financial statements; (3) Client's commitment; (4) Asset structure & quality; (5) Economic trends; (6) Other factors.

The lender must choose one of the available responses for each question.

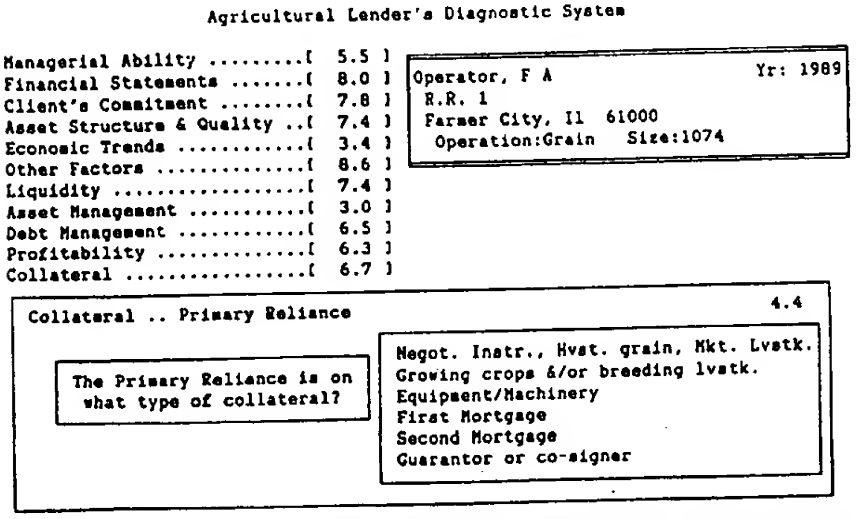

Fig. 2. ALDS screen display of a qualitative question in the Asset Structure & Quality category.

percentage weight within that category and each category accounts for a percentage of the final score. For instance, the financial statement preparation question accounts for 15% of the category score and therefore, 1.65% (0.15×0.11) of the final score. The category values displayed in Table 2 are those for the Operating loan only. Sets of default category values also exist for Asset Purchase and Other types of loans. These default values can be altered by the user with the category weighting schedule.

The final five categories of concern do not solicit input from the lender, but rather display the results of the calculation of various financial ratios, as well as indicate whether the particular ratios are considered 'Strong', 'Moderate' or 'Weak'. (The method of determining this description is discussed above.) There are 15 different ratio comparisons, each displaying its results in turn.

TABLE 3

Defaults weights on quantitative categories and ratios in ALDS

Category or ratio	Weight (%)		Ratio limits	
			Strong/Moderate	Moderate/Weak
Liquidity	10			
Current assets/current liabilities		33	1.50	≥ 0.80
Loan size/capital debt repayment capacity (current)		33	0.40	≤ 1.00
Loan size/capital debt repayment capacity (projected)		33	0.40	≤ 1.00
Asset management	10			
Current assets/total assets		30	0.20	≤ 0.30
Fixed assets/total assets		30	0.20	≤ 0.30
Value of farm production/total assets (current)		20	0.50	≤ 0.80
Value of farm production/total assets (projected)		20	0.50	≤ 0.80
Debt management	10			
Total liabilities/total assets		20	0.20	≤ 0.45
Interest expense/value of farm production (current)		20	0.15	≤ 0.25
Interest expense/value of farm production (projected)		20	0.15	≤ 0.25
Times interest earned (current)		20	3.00	≤ 6.00
Times interest earned (projected)		20	3.00	≤ 6.00
Profitability	10			
Return on assets (current)		55	1.00	≥ 0.50
Return on assets (protected)		45	1.00	≥ 0.50
Collateral	10			
Collateral value/loan size		100	0.50	≤ 0.80

eters governing the operation of the program is desirable to the users, in that the default parameters may not correspond to the individual user's perceptions. Therefore, the opportunity to enter new parameters more closely paralleling the user's perceptions is essential. These parameters are linked to the user's login identification. Therefore, several lenders can use ALDS on a single computer with their own personalized loan scoring parameters.

The parameters which can be altered include three weighting schedules and a ratio limit schedule. The three weighting schedules include the category weighting schedule (weights each category by type of loan), a question weighting schedule (weights each question within each category) and an answer weighting schedule (assigns a value, or score, to each possible response to the individual questions within each category). The question weighting schedule and the answer weighting schedule relate only to the qualitative portion of the analysis while the category weighting schedule applies to both the qualitative and the quantitative sides.

The ratios limit schedule allows the editing of the limits against which the various ratio calculated from the client's quantitative data are compared. These ratios are listed in Table 3, also showing the corresponding weights and the limits for each ratio. Each ratio comparison has two limits: a 'Strong' and a 'Weak' limit. A ratio falling beyond the Strong limit is awarded the value assigned to a Strong ratio for the particular question. Similarly, if the ratio falls beyond the Weak limit, it is awarded the value of a Weak ratio for the question. A ratio falling between the limits is termed 'Moderate', and is given the value associated with a Moderate ratio.

Other supporting tasks are location-specific help screens and various entry and alteration forms such as new lender forms, new client forms, client financial data forms, interest rate forms, and loan size and collateral value forms. Each of these supporting tasks is accessed though the use of 'hot keys' or 'function keys', and several can also be accessed as menu choices.

SUMMARY COMMENTS

The database structure of ALDS for the storage of information consists mainly of individual files for each client, controlled by a single index file. Lender records are also stored in this fashion, allowing each lender who uses a copy of ALDS to create his or her own personal weighting schedules separate from other users. While this allows for disparity between lenders, it is important to provide for the division of the responsibility. The ability for each lender to use a customized criteria set allows the flexibility for an individual lender's responsibility for his or her decisions, while also allowing the employment of a single criteria set mandated by management.

The overall intent of this system is to provide a means by which agricultural lenders can employ a structured system of ranking loan applications relative